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# A synopsis of the Afrotropical Diastatidae (Diptera), with the description of five new species from southern and east Africa and first record of the Campichoetinae

by

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## ABSTRACT

A synopsis of the Afrotropical Diastatidae is provided. The family is characterised based on these species. The world fauna, distribution of *Diastata* Meigen and *Campichoeta* Macquart, and the relationships of these genera are briefly discussed. Support is given for the refutation by McAlpine (1989) of the concept that *Diastata* is more closely related to the Ephydridae than to *Campichoeta* and *Euthychaeta* Loew, although the subfamily concepts Diastatinae and Campichoetinae are adopted. Detailed keys to the Afrotropical genera and subfamilies are provided.

The boreal distribution of African *Diastata* species is reviewed and compared to that of the South American fauna. The distribution pattern of southern African species is assessed separately. An illustrated key to the eight Afrotropical species is presented. Three new species are described from Natal, South Africa: *falcata*; *interrupta*; *whittingtoni*. The female of *D. carolinae* Cogan is described, and *D. tsacasi* Cogan is recorded from the Transvaal and eastern Cape Provinces of South Africa, both for the first time. Species are diagnosed based predominantly on wing patterning and features of the male terminalia; the affinities of all species are covered in detail.

The subfamily Campichoetinae (*Campichoeta*) is recorded from the Afrotropical Region for the first time. Two closely allied montane species are described: *edwardsi* (Ethiopia and Kenya) and *natalensis* (Natal, South Africa). A key to the two species is presented.

The distribution patterns of African Diastatidae are discussed relative to those of other boreal and/or montane invertebrates, including particular Opomyzidae and Chloropidae. Tentative theories explaining the current disjunct distributions of *Campichoeta* and *Diastata* are suggested.

## INTRODUCTION

The Diastatidae is a small acalyptrate family belonging to the superfamily Ephydroidea (*sensu* McAlpine 1989). All Afrotropical species are tiny, usually about 2,5 – 3,5 mm in length, and given their resemblance to Drosophilidae are presumably often overlooked by collectors in the field; nothing is known about their immature stages, but it is likely that larvae develop in decaying wood (this suggested for the Palaearctic fauna by Papp (1984)). Adults appear to have a definite preference for wet-forest in cool to warm temperate regions or at high altitude in the tropics. They are usually swept from grass adjacent to forest margins, or from similar vegetation on shaded stream banks. The Afrotropical Diastatidae are still known from only about 40 specimens and further material is unlikely to be collected unless particularly targeted. The family can be diagnosed from other acalyptrates by the following combination of character states (see Fig. 1): two strong pairs of orbital setae, the proclinate seta inserted lateral to the reclinate seta; postocellar setae convergent; arista pubescent to long plumose; vibrissa developed; thorax with distinct hump-backed appearance in profile; costa always broken near junction with $R_1$; subcosta evanescent apically; basal crossvein (bm-cu) present; anal cell present; dorsal pre-apical seta present on all tibiae. Of the four other ephydroid families, Diastatidae are most likely to be confused with Drosophilidae and Curtonotidae. Drosophilidae (and Camillidae) are immediately distinguished by not having the proclinate orbital seta lateral to the well developed reclinate seta, and Curtonotidae by lacking the basal crossvein as occurs in Ephydridae.

About 42 species from all regions except Australasia are now included in the Diastatidae. The family is mainly Holarctic, with about half the known species recorded from the Palaearctic and Nearctic Regions and at least two species shared between them. The southern hemisphere (Neotropical and Afrotropical Regions) is relatively depauperate, with only 13 described species. Three extant genera and one Baltic Amber genus have generally been included in the Diastatidae *s. l.* These are *Diastata* Meigen, *Campichoeta* Macquart, *Euthychaeta* Loew and (see Hennig 1965) the two fossil species of *Pareuthychaeta* Hennig. However, this aggregation of genera is not uncontroversial and although McAlpine (1962 1987 1989) supports the broader family concept, Griffiths (1972)

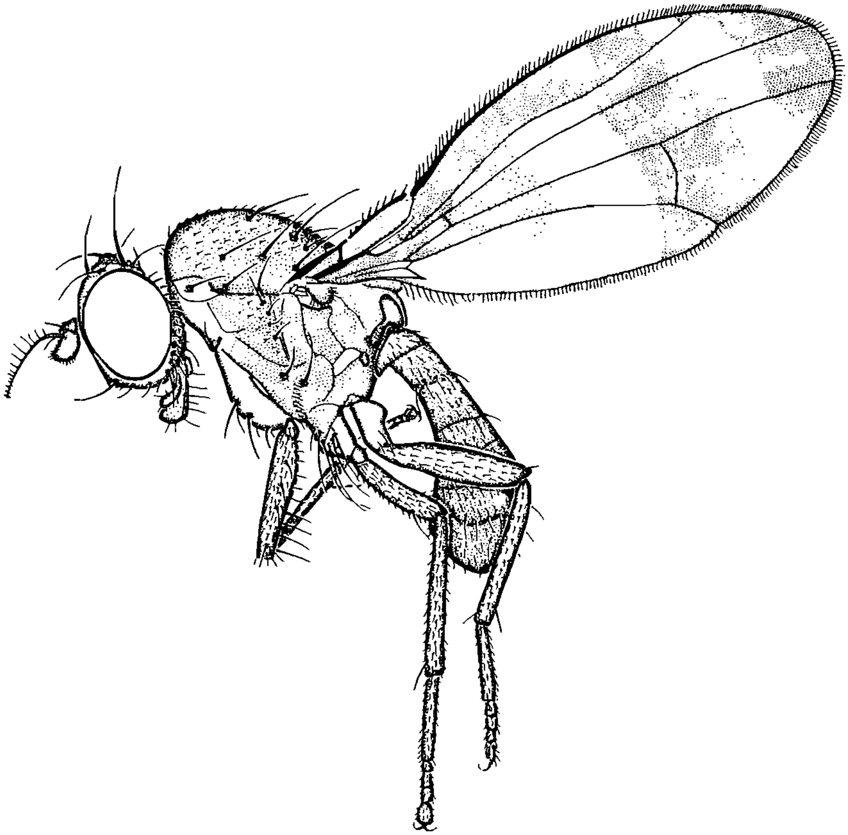


Fig. 1. *Diastata tsacasi* Cogan, entire male.

removed *Diastata* to the Ephydridae and termed the remaining segregate (*Campichoeta* and *Euthychaeta*) the Campichoetidae. Cogan (1975) supported the exclusion of *Diastata* from the Diastatidae, and Chandler (1987) retained *Diastata* in the Diastatidae but removed *Campichoeta* to the Campichoetidae. I support the broader concept of the Diastatidae, particularly since McAlpine (1989) has clearly been able to refute the assertion that *Diastata* is more closely related to the Ephydridae than to *Campichoeta* and *Euthychaeta* (see discussion under *Diastata*). However, I also concur with Papp (1984), who considered a subfamilial classification, namely the Diastatinae for *Diastata* and Campichoetinae for the other two genera. I would expect that these groupings will prove to be monophyletic; they are well distinguished by external morpological characters (see subfamily key, below) and features of the male and female postabdomen (refer to discussions under genera). McAlpine (1989) maintains that the Diastatidae *s. l.* are the sister group of the Ephydridae.

## MATERIALS AND METHODS

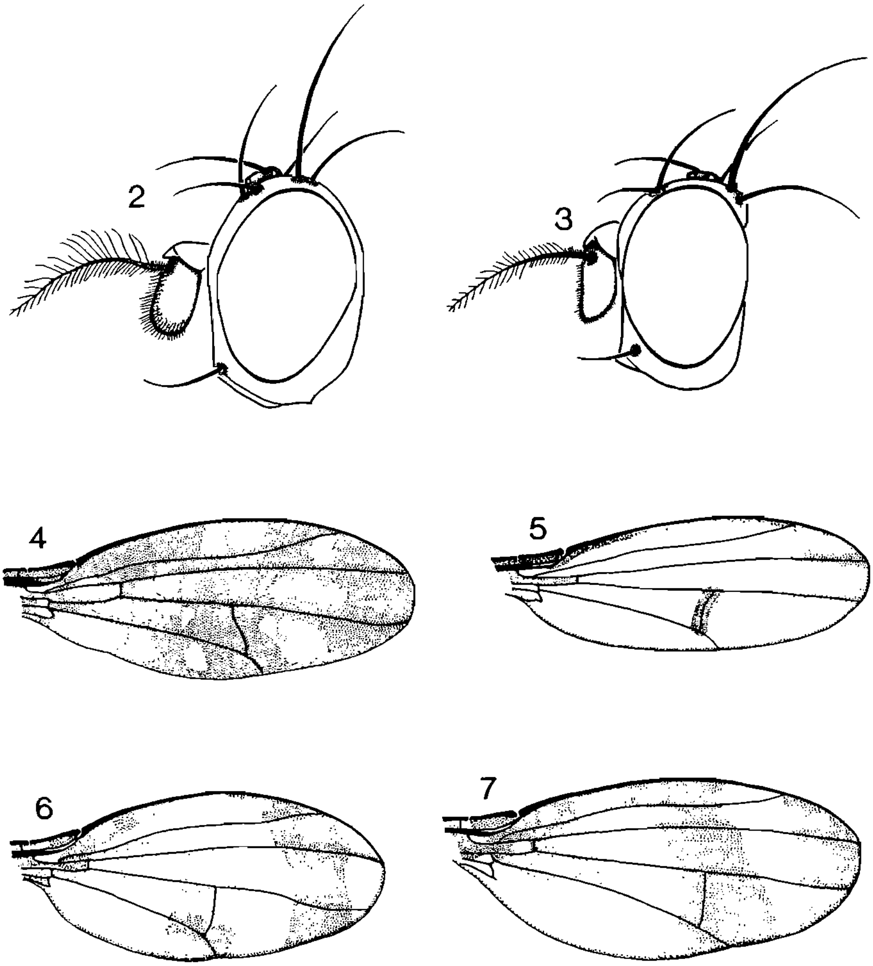
This study was based on the examination of pinned adult Diastatidae from the following depositories (acronyms in parentheses):

Natal Museum, Pietermaritzburg (NMSA)
The Natural History Museum, London (BMNH)

Morphological terminology (external features) is based, with some modification, on that of Cogan (1975 1980*b*). The terms bm-cu and dm-cu are used for the crossveins bounding the discal cell of the wing (see McAlpine (1981:30)). I have also used the terms of McAlpine (1987) when describing postabdominal structures.

Bilaterally symmetrical features are described in the singular. Label data of holotypes (new species only) are quoted exactly as they appear, although supplementary information is sometimes given in square parentheses; a slash (/) denotes the end of a line of print and a semicolon separates data quoted on different labels. Holotype measurements are given in square parentheses following the range for other specimens examined. The male is always described first and only differing character states are cited under the female. The method of citation under 'Other material examined' has been standardised for dates of collection and co-ordinates, and therefore may not be exactly as found on specimen labels.

The male postabdomen was dissected free and the entire female abdomen detached, for maceration in warm potassium hydroxide. Features of the male terminalia were drawn under high magnification using the drawing tube of a Wild M5 stereomicroscope. Following study, the terminalia of *Diastata* species were stored in glycerine microvials pinned beneath particular specimens. The terminalia of *Campichoeta* are exceptionally small and were mounted in Canada Balsam on transparent cellulose, pinned beneath the specimen. Only the left side of the epandrium (vestiture omitted), the left surstylus and gonite are figured. The surstylus is always divided into two distinct lobes in Diastatinae. These are always visible when the entire terminalia are viewed in profile, as figured below



Figs 2–7. Head and wing characters of Afrotropical Diastatidae. 2–3. Head profile, showing major setae and vestiture of third antennal segment and arista. 2. *Diastata tsacasi* Cogan. 3. *Campichoeta edwardsi* sp. n. 4–7. Wing patterning (costal vestiture omitted). 4. *D. carolinae* Cogan. 5. *D. falcata* sp. n. 6. *D. interrupta* sp. n. 7. *D. tsacasi* Cogan.

(see eg. Fig. 20). In such illustrations the dorsally and ventrally positioned lobes are termed the upper and lower lobes respectively.

Body length comprises the sum of two measurements: (1) distance between anterior margin of third antennal segment and abdominal base, (2) distance between abdominal base and apex. The wing was measured from the humeral cross-vein to the wing-tip. When the width of the third antennal segment is referred to, this is always profile width. Illustrations of the wing were undertaken with it positioned above a strongly backlit white surface.

## Key to Afrotropical genera and subfamilies of Diastatidae

[Note: Postabdominal characters are excluded from this key, but are discussed under each genus. For diagnosis of *Euthychaeta* (Palaearctic), see McAlpine (1962:1).]

1 Third antennal segment with distinctly pendent appearance, well separated from facial profile; dorsal and apical margins with noticeable pubescence; arista short to long plumose, length of vestiture usually 0,5–1,0 × width of third segment (Fig. 2). Large reclinate orbital seta inserted at anterior extremity of upper orbital plate, consequently positioned noticeably anterior to proclinate seta (Fig. 2). Occiput without setae on dorsolateral surfaces. Mesopleuron not bare, with serial short setulae along posterior margin and usually with minute setulae scattered over posterior half. Costa with distinct humeral break usually visible; cubital vein with length of apical section 0,4–1,0 × that of crossvein dm-cu (see eg. Fig. 8) .................................. **Diastata** Meigen [Diastatinae]

– Third antennal segment not with pendent appearance, flush with or closely approximated to facial profile; dorsal and apical margins with pubescence not or barely visible; arista long pubescent, length of vestiture at most reaching 0,5 × width of third segment (Fig. 3). Large reclinate orbital seta not inserted at anterior extremity of upper orbital plate, consequently positioned slightly posterior to proclinate seta (Fig. 3). Occiput with 2 inwardly directed setae positioned dorsolaterally on each side. Mesopleuron completely bare, without short setulae along posterior margin. Costa with humeral break not visible, although sometimes slightly attenuated in this region; cubital vein with length of apical section 2,5–3,0 × that of crossvein dm-cu (see eg. Fig. 13) ........... **Campichoeta** Macquart [Campichoetinae]

## SUBFAMILY DIASTATINAE

### *Diastata* Meigen, 1830

*Diastata* Meigen, 1830: 94. Type species (Holarctic): *Geomyza obscurella* Fallén, 1823, *sensu* Meigen [misidentified, = *Diastata vagans* Loew, 1864], designated by Westwood (1840: 152).

*Diastata* comprises about 33 species from all faunal regions, except Australasia (including the three southern African species described below). It is predominantly Palaearctic, with five Nearctic species (McAlpine 1987), apparently three Neotropical species (Do Prado 1984), eight Afrotropical species (see Cogan 1980*b*) and at least eight species from the northern fringe of the Oriental Region (these all described from Nepal by Chandler (1987)).

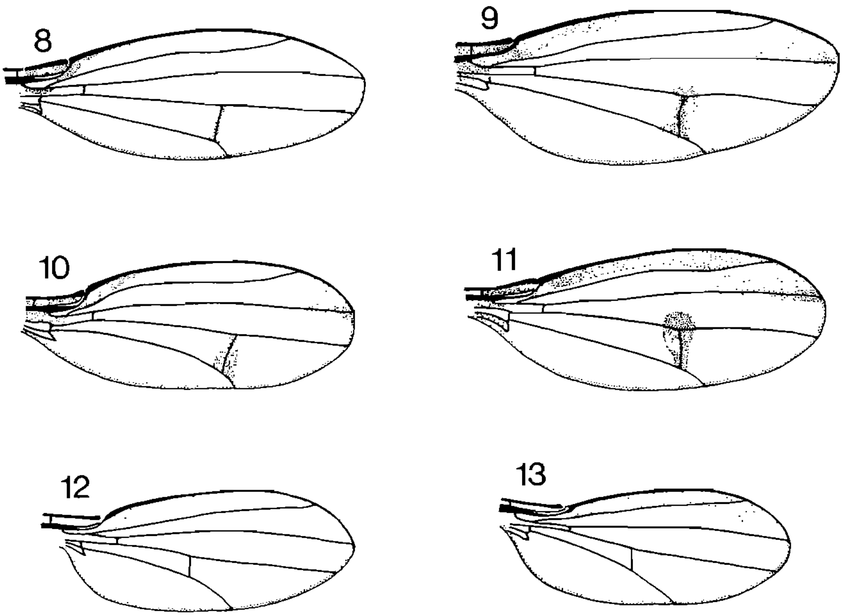
The Afrotropical species have been delimited using both external characters and structural features of the male postabdomen. Many characters such as body colouring, wing patterning, disposition of pruinescence, shape and vestiture of the upper surstylic lobe (profile and dorsal view) have previously been utilised by Cogan (1975 1980*b*). The length of aristal plumosity and particularly the shape of the gonite in ventral view are examples of additional characters treated in this paper. Although the shape of the lower surstylic lobe and the length of vestiture along its dorsal margin are characters of taxonomic value, which are referred to below, these should be treated with caution. This is because the entire lobe may swivel relative to the epandrium, producing erroneous profile views.

Griffiths (1972) transferred *Diastata* to the Ephydridae, given that sclerotised spermathecae are absent and that the ventral receptacle is heavily sclerotised (these character states confirmed in *D. tsacasi* Cogan, the only Afrotropical species dissected). McAlpine (1989) pointed out that sclerotised spermathecae have been lost repeatedly within the acalyptrates, and are much reduced in the Camillidae [apparently absent in the southern African species I have examined]. In such instances, McAlpine suggests that their function is supplemented and apparently replaced by the ventral receptacle, and that the strongly sclerotised condition of the receptacle in both *Diastata* and Ephydridae is not phylogenetically significant, as different forms and positioning of the receptacle have developed independently in each family. McAlpine, in my opinion, thus correctly refutes Griffith's assertion that *Diastata* is more closely related to the Ephydridae than to other Recent genera of Diastatidae (*Campichoeta*, *Euthychaeta*), and I consider that all three genera belong to the Diastatidae. In terms of external characters, Diastatidae differ strikingly from Ephydridae, having convergent postocellar setae, the anal cell developed, crossvein bm-cu present, and a pre-apical dorsal seta on all tibiae (see McAlpine 1987: 1022).

The female terminalia of *D. tsacasi* (not previously examined in Afrotropical species) are similar to the Holarctic species *D. vagans* Loew, and the ventral receptacle appears to be virtually identical (see McAlpine 1987: 1021). There are six pairs of spiracles, segments 6 and 7 have the tergites and sternites fused into continuous rings although noticeably membranous mid-dorsally, sternite 8 is well developed basally but otherwise divided along the remainder of its length, and the cerci are well separated with two elongate setulae apically.

As noted by Cogan (1980*b*), the Afrotropical species of *Diastata* have a typical boreal distribution, being restricted to montane regions in tropical areas, but also occurring at lower altitudes in temperate parts of southern Africa. Thus two species (*D. montana* and *D. paramontana*) are known only from montane parts of Cameroon in west Africa, while the remaining six species (all southern African) occur at lower altitude, sometimes virtually at sea level, but usually in more elevated regions. It is possible that the genus will be collected at high altitude in forested parts of Zimbabwe. In southern Africa *Diastata* has been collected only in eastern and southern South Africa (Fig. 38). The boreal distribution of the Afrotropical species is comparable to that of the Neotropical species (see Do Prado 1984), which are known only from altitudes above 2000 m in Costa Rica, Bolivia and Peru, but also at low altitude in temperate Argentina (*D. argentina* Malloch, 1934, known only from Buenos Aires). The latter species, would seem to occur in temperate coastal forest, as does the South African species *D. carolinae* (see Fig. 38); both are recorded from very similar latitudes (about 34°S).

Virtually all South African species are likely to have been swept from grassland or short vegetation at forest margins or adjacent to moist areas, often partly shaded streams. This is similar to the habitats cited for Nearctic and Palaearctic species by McAlpine (1987) and Cogan (1975) respectively. Nothing is known about the biology or behaviour of Afrotropical species. According to McAlpine (1987), males of some Holarctic species vibrate their wings in an otitid-like fashion when sexually excited.



Figs 8–13. Wing patterning of Afrotropical Diastatidae (costal vestiture omitted). 8. *Diastata montana* Cogan. 9. *D. paramontana* Cogan. 10. *D. whittingtoni* sp. n. 11. *D. stuckenbergi* Cogan. 12. *Campichoeta edwardsi* sp. n. 13. *C. natalensis* sp. n.

## Key to Afrotropical species of *Diastata*

[*D. montana*, *D. paramontana* and *D. whittingtoni* are a cluster of species which, based on external characters, can only be separated using subtle distinctions in wing patterning. When examining the wing of these species, it is important that it be positioned above a strongly backlit white surface.]

1 Wing membrane predominantly dark brown, strikingly contrasted with small irregular white markings (usually somewhat ovoid) (Fig. 4). Male terminalia as in Figs 14–16. [Cape Province, South Africa] .......... **carolinae** Cogan

– Wing membrane never predominantly dark brown with white markings, either mainly hyaline with inconspicuous darker markings (eg. Fig. 5) or if partly dark then latter region not strikingly contrasted with pale markings (eg. Fig. 7) .......... 2

2 Thoracic pleuron and mesonotum noticeably bicolorous, always partly pale (yellow or orange-brown) .......... 3

– Thoracic pleuron and mesonotum usually entirely dark brown to black, occasionally with humeral callus and adjacent regions pale .......... 4

3 Frons with strips of silver pruinescence adjacent to eye margins. Length of aristal plumosity reaching 0,8–1,0 × width of third antennal segment. Scutellum partly to entirely pale. Wing with dm-cu surrounded by dark infuscation along entire length, also dark tinged over apical sections (distal to junction of $r_{2+3}$ with costa) of cells $r_{2+3}$ and $r_{4+5}$ (Fig. 5). Male terminalia as in Figs 17–19. [Natal Province, South Africa] ............ **falcata** sp. n.

– Frons without strips of silver pruinescence adjacent to eye margins. Length of aristal plumosity reaching 0,6 × width of third antennal segment. Scutellum entirely dark. Wing with dm-cu broadly surrounded by yellow infuscation, except dark near junction with cubital vein; apex with complete, dark transverse fascia, this strongly curved and excluding wing-tip (Fig. 6). Male unknown. [Natal Province, South Africa] ......... **interrupta** sp. n.

4 Wing boldy patterned; dark brown infuscated over much of cell $r_1$ to about level with dm-cu and then continuous with broad transverse fascia arched across dm-cu, extreme apex also with dark transverse fascia (Fig. 7). Male terminalia as in Figs 20–22. [Transvaal, Natal and Cape Provinces of South Africa] ............................................................. **tsacasi** Cogan

– Wing inconspicuously patterned; infuscation restricted to costal margin (particularly basally) and sometimes extending as far as apex of $R_{4+5}$, also developed around dm-cu (eg. Fig. 10) ............................................ 5

5 Frons without strips of silver pruinescence adjacent to eye margins. Ocellar triangle generally dark, contrasted with surrounding yelloworange ground colour. Male terminalia as in Figs 26–28. [Cape Province, South Africa] ........ **stuckenbergi** Cogan

– Frons with strips of silver pruinescence adjacent to eye margins. Ocellar triangle pale (yellow-orange) ....................................................... 6

6 Wing membrane completely hyaline near apex of $R_{4+5}$, infuscation indistinct and pale around dm-cu (Fig. 8). Male terminalia as in Figs 29–31. [Cameroon] ....................................................... **montana** Cogan

– Wing membrane darkened near apex of $R_{4+5}$, infuscation noticeably dark around dm-cu (eg. Fig. 11) ....................................................... 7

7 Wing with infuscation reaching almost half distance between $R_1$ and $R_{2+3}$ along costal margin and extending anteriorly from around dm-cu into adjoining cell (Fig. 9). Male terminalia as in Figs 32–34; upper surstylic lobe with smoothly rounded apex in profile and dorsal view. [Cameroon] ............ **paramontana** Cogan

– Wing with infuscation reaching about third distance between $R_1$ and $R_{2+3}$ along costal margin and not extending anteriorly from around dm-cu into adjoining cell (Fig. 11). Male terminalia as in Figs 35–37; upper surstylic lobe with sharply pointed apex in profile and dorsal view .... **whittingtoni** sp. n.

### *Diastata carolinae* Cogan, 1975

Figs 4, 14–16

*Diastata carolinae* Cogan, 1975: 487; Cogan, 1980*a*: 670.

Material examined: SOUTH AFRICA: *Cape Province*: Holotype ♂, Kloof Nek, Cape Town, 1–2.i.1972, Southern African Exp. B.M. 1972 (BMNH); 1 ♀, Outeniqua State For., near Knysna, 3323CC, 23.i.1984, D. & C. Barraclough, Forest and forest margins (NMSA); 1 ♀, Storm's River State For., 3423BB, 24.i.1984, D. & C. Barraclough, Forest margins (NMSA).

*Discussion*: This species was described from Cape Town by Cogan, based on the unique male holotype. The female is recorded here for the first time from two localities in the Knysna area. *D. carolinae* is the only southern African species of Diastatidae which occurs in forested coastal regions. It is also the only Afrotropical species with predominantly dark brown wings contrasted with white markings, and is immediately recognisable.

The female differs from the male in the following main character states: face, dorsal and apical margins of third antennal segment darker; single anteroventral ctenidial spine on fore femur; humeral callus paler; prescutellar acrostichal setulae sometimes developed; dm-cu noticeably sinuous.

### **Diastata falcata** sp. n.

Figs 5, 17–19

Holotype: SOUTH AFRICA: 'SOUTH AFRICA: NATAL / Itala Game Reserve / Craig Adam Dam / 27°28'S 31°25'E, iii.1991 / R.M. Miller, Malaise trap'; 'HOLOTYPE ♂/ Diastata falcata / BARRACLOUGH' [Rectangular card, red perimeter]. In fairly good condition, although collected from ethanol, meaning that the description of pruinescence (below) may not be accurate. In NMSA (type no. 466).

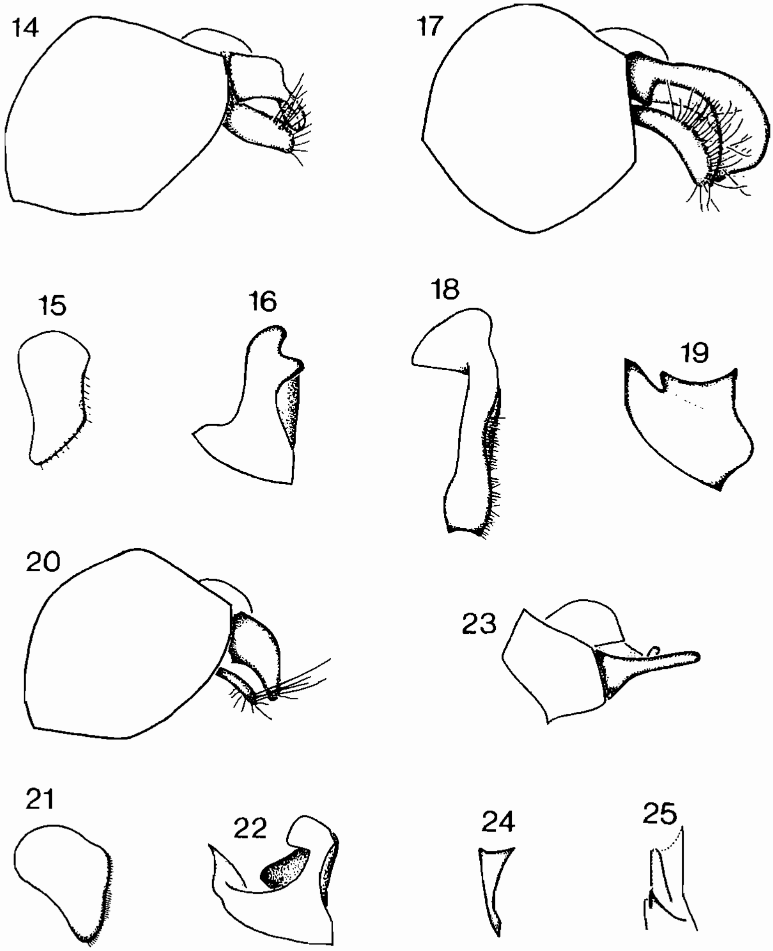
Etymology: L. *falcatus* = sickle-shaped, hooked. Refers to the elongate upper lobe of the surstylus, which is sickle-shaped in profile.

Male: Dimensions (in mm): Body length 3,8 [3,8]; wing length 2,4 [2,4].

*Colouring/Pruinescence* (Fig. 5): Head predominantly yellow-brown to pale orange with dense silver pruinescence on gena, subgena, parafacial, face and on frons adjacent to eye margins, but sparsely yellow pruinescent on excavate section of occiput; ground colour slightly darker on arista, along dorsal margin of third antennal segment and adjacent to pruinescent strips on frons, but markedly darker dorsolaterally on occiput. Thorax and legs largely yellow-brown to yellow-orange with broad silver pruinescent vittae extending from anterior mesonotal margin to prescutellar region between dorsocentral rows and supra-alars on each side; ground colour slightly darker on apical tarsal segments and markedly so on postnotum, beneath pruinescent vittae, medially on scutellum and as narrow paired vittae on anterior half of mesonotum between dorsocentral rows. Wing hyaline with brown to black infuscation over extreme basal region, much of costal cell, along costal margin for entire length of cell $r_1$ (indistinct distally) and over apical sections (distal to junction of $R_{2+3}$ with costa) of cells $r_{2+3}$ and $r_{4+5}$; dm-cu surrounded by very dark infuscation along entire length, this extends slightly, both anteriorly and posteriorly, into adjoining cells (Fig. 5). Abdomen very dark brown to black with indistinct pruinescence.

*Head*: Aristal plumosity unusually long, length almost subequal to width of third antennal segment. Epistome not protruding anterior to vibrissal insertion in profile. Ocellar triangle positioned well anterior to eye centre in profile. Postvertical setae not present.

*Thorax*: Fore femur with 1–2 short ctenidial spines anteroventrally, length reaching width of tibial base in profile. Mesopleuron with 4 short setulae along



Figs 14–25. Male terminalia of Afrotropical Diastatidae (epandrium and surstylus in profile, upper surstylic lobe in dorsal view, gonite in ventral view). 14–22. *Diastata* species. 14–16. *D. carolinae* Cogan. 14. Epandrium and surstylus. 15. Upper surstylic lobe. 16. Gonite. 17–19. *D. falcata* sp. n. 17. Epandrium and surstylus. 18. Upper surstylic lobe. 19. Gonite. 20–22. *D. tsacasi* Cogan. 20. Epandrium and surstylus. 21. Upper surstylic lobe. 22. Gonite. 23–25. *Campichoeta edwardsi* sp. n. 23. Epandrium and surstylus. 24. Surstylus. 25. Gonite (anterior and posterior gonopophyses).

posterior margin and minute setulae scattered over posterior half. Prescutellar acrostichals present, weakly developed. Crossvein r-m positioned at about basal quarter of discal cell; dm-cu virtually straight or very slightly sinuous.

*Terminalia* (Figs 17–19): Parameres developed basomedially between gonites, apically with distinct setulae. Gonite unusually shortened in ventral view, with striking thorn-like apical projection (Fig. 19). Upper lobe of surstylus sickle-shaped in profile, although markedly broader basally and apically (Fig. 17); subequal to length of epandrium in profile (Fig. 17); inner surface bearing minute setulae apically and along apical two-thirds of dorsal margin (Fig. 18). Lower lobe of surstylus mostly parallel-sided in profile, although visible sections narrower apically and basally (Fig. 17); long sinuous setulae (reaching more than twice profile width) along much of visible dorsal margin (Fig. 17) and with vestiture about half this length on inner, apical surface.

Female: Dimensions (in mm): Body length 3,1–3,6; wing length 2,6–2,8.

*Colouring/Pruinescence*: Occiput markedly darker dorsomedially and dorsolaterally. Scutellum entirely pale. Mesonotum sometimes with 3 dark vittae on anterior half between dorsocentral rows. Infuscation indistinct along costal margin in apical two-thirds of cell $r_1$. Abdomen with cercus yellow-brown.

*Head*: Postocellar setae weakly developed, about half strength of ocellar setae.

*Thorax*: Fore femur with 1 very weak ctenidial spine anteroventrally, length about half width of tibial base in profile.

Other material examined: SOUTH AFRICA: 3 ♀ (paratypes), same label data as holotype (NMSA).

*Discussion*: *Diastata falcata* and *D. interrupta* are the only two Afrotropical species with the thoracic pleuron and mesonotum predominantly pale. *D. falcata* is very easily distinguished from the latter species by the presence of silver pruinescent strips on the frons adjacent to the eye margins and by characteristic wing patterning (dm-cu surrounded by dark infuscation along entire length and apical region without complete, dark transverse fascia).

The male terminalia (gonite and particularly upper lobe of surstylus) have highly distinctive shapes in ventral view and profile respectively, and show no affinity with other Afrotropical species. The upper surstylic lobe is uniquely sickle-shaped and unusually elongate in profile (Fig. 17); the lobe of other species is often much shorter, at most reaching about three-quarters length of the epandrium.

The male holotype lacks postocellar setae, although these are present in all the female paratypes. It is most likely that this is a teratological feature which does not represent sexual dimorphism.

### **Diastata interrupta** sp. n.

Fig. 6

Holotype: SOUTH AFRICA: 'SOUTH AFRICA: Natal / Howick 7.ix.1990 / 29°28'40''S:30°13'20''E / Streamside vegetation / A.E. Whittington'; 'HOLOTYPE ♀ / Diastata interrupta / BARRACLOUGH' [Rectangular card, red perimeter]. The holotype is in good condition, albeit slightly greasy. In NMSA (type no. 467).

Etymology: The species name refers to the apparently 'interrupted' transverse fascia across vein dm-cu (Fig. 6); a similar fascia is complete in *D. tsacasi* (Fig. 7).

Male: Unknown.

Female: Dimensions (in mm): Body length [3,0]; wing length [2,8].

*Colouring/Pruinescence* (Fig. 6): Head almost entirely yellow-brown with silver pruinescence on parafacial and face (and possibly gena), but yellow pruinescent on excavate section of occiput; ground colour darker on arista and dorsomedially on occiput. Thorax partly yellow-brown to dark orange and legs almost entirely yellow-brown, thoracic pruinescence silver (difficult to discern because of greasiness) and evident on sternopleuron below setae, on notopleural region and on dark ground colour on posterior half of mesonotum (scutellum excluded); ground colour slightly darker on apical tarsal segments and markedly so on postnotum, much of pteropleuron, posterior half of sternopleuron, posterior half of humeral callus, notopleural region, medially and laterally on posterior half of mesonotum and over much of scutellum (anterolateral margins excepted). Wing strongly patterned (Fig. 6); extreme basal region with mixture of pale (yellow) and dark (brown to black) infuscation; apical half of costal cell and basal two-fifths of cell $r_1$ dark, tinged with yellow posterior to this and distal to r-m, reaching and covering basal two-fifths of discal cell; anterior two-thirds of dm-cu broadly surrounded by yellow infuscation, this extending anteriorly across cell $r_{4+5}$ to be narrowly arched across cell $r_{2+3}$, coalescing with more basal yellow infuscation; posterior third of dm-cu broadly surrounded by dark infuscation, this extending continuously to posterior margin across cubital vein; subapical region with complete, dark transverse fascia arched from apical part of cell $r_1$ to posterior margin; apical part of cell $r_{2+3}$ with yellow infuscation distal to dark fascia. Abdomen dark brown to black with no visible pruinescence and with yellow-brown cerci.

*Head*: Aristal plumosity relatively short, length about 0,5 × width of third antennal segment. Epistome protruding anterior to vibrissal angle in profile. Ocellar triangle positioned just anterior to eye centre in profile. Postocellar setae present, moderately weaker than ocellar setae.

*Thorax*: Fore femur with ctenidial spines not or barely differentiated from surrounding vestiture on anteroventral surface. Mesopleuron with 3–4 short setulae along posterior margin and minute setulae barely visible on posterior surface. Prescutellar acrostichals present, very weakly developed. Crossvein r-m positioned at about basal fifth of discal cell; dm-cu slightly to strongly arched.

*Discussion*: Although based on a single female, I decided to describe this species given the unusual wing patterning and thoracic colouration. The affinities of *interrupta* are unclear, although it is superficially reminiscent of *D. tsacasi*, which is the only other Afrotropical species with complete, dark transverse fasciae across the apical region of the wing. However, it differs from *tsacasi* by having only one complete transverse fascia and a partly pale mesonotum and thoracic pleuron.

The upper orbital plates (bearing the orbital setae) are a curious red colour in the female holotype. I have not mentioned this in the above description as the head of the holotype is rather greasy, with little pruinescence evident, and the undisturbed colouring of the frons may be somewhat different.

The holotype was swept from short, partially shaded streamside vegetation at about 5.30 pm. Despite subsequent attempts the species has not been collected again, and it may be crepuscular, although *D. whittingtoni* was taken at the same locality in mid afternoon and early evening.

### *Diastata montana* Cogan, 1975

Figs 8, 29–31

*Diastata montana* Cogan, 1975: 485; Cogan, 1980*a*: 670.

Material examined: CAMEROON: Holotype ♂, Mt Cameroon, Onyanga, 8100 ft, 24.i.1932, M. Steele, By sweeping (BMNH).

*Discussion*: This species has close affinity with *D. paramontana* and *D. whittingtoni* (see discussion under *whittingtoni*). In terms of external characters it is distinguished from both species by subtle features of wing patterning, namely the lack of infuscation near the apex of $R_{4+5}$ and the very pale infuscation bordering dm-cu (see Fig. 8).

The male terminalia (shape of gonite in ventral view and of upper and lower lobes of surstylus in profile and dorsal view) suggest a closer affinity with *whittingtoni* from Natal, South Africa. Both species have the distal part of the upper surstylic lobe sharply narrowed and apically pointed (cf. Figs 29 & 35), unlike all other Afrotropical species known from males. However, *montana* does differ significantly from *whittingtoni* in the overall shapes of the above structures (refer to discussion under latter species) and is clearly distinct.

### *Diastata paramontana* Cogan, 1980

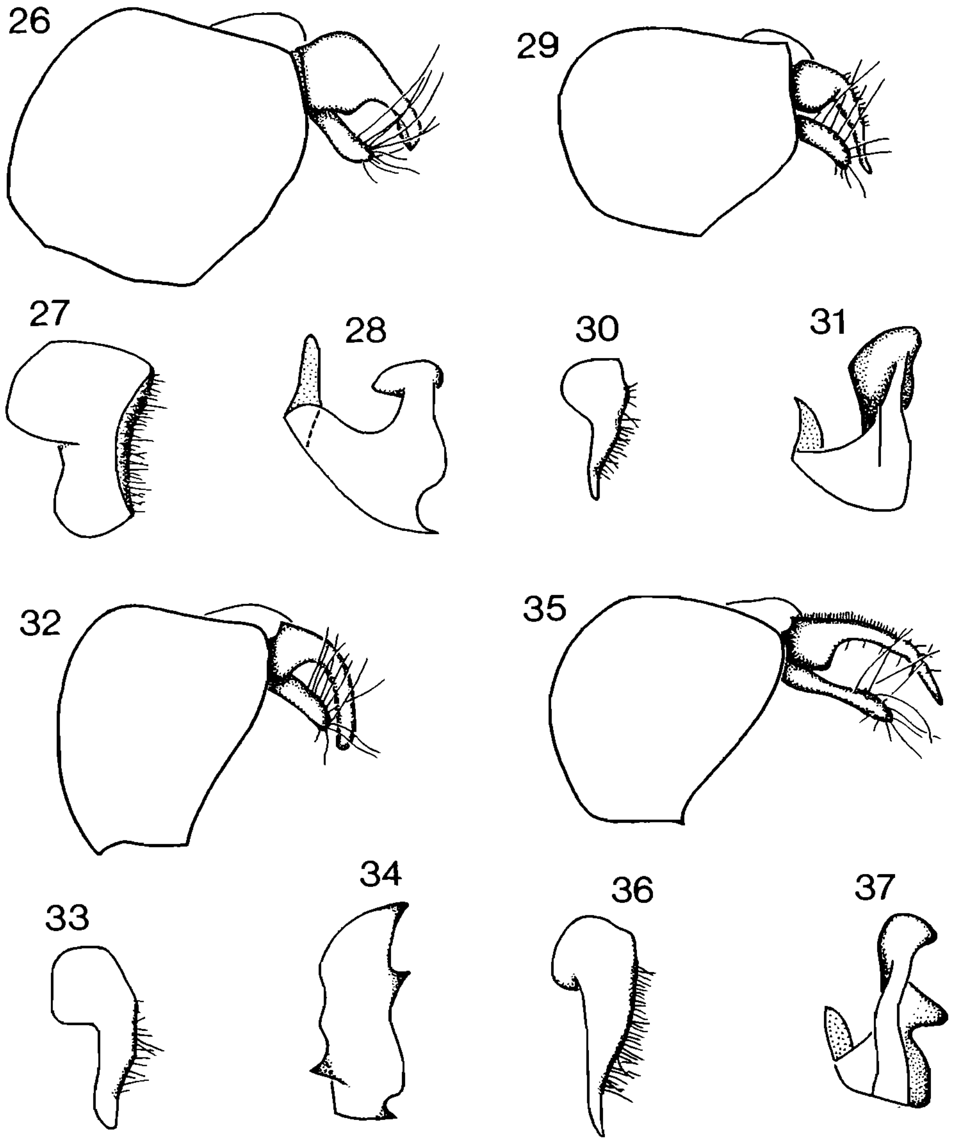
Figs 9, 32–34

*Diastata paramontana* Cogan, 1980*b*: 247.

Material examined: CAMEROON: Paratype ♂, Bafut Nguemba, Vallée de la Haute Nguemba, Province du Nord Ouest, 2100 m, 31.x.1975, Mission Cameroun C.N.R.S. RCP 318 (BMNH).

*Discussion*: This species was described from northwestern Cameroon by Cogan (1980*b*), based on three males and two females; the holotype and 1♂ 2♀ paratypes are in the Paris Museum. As discussed above under *D. montana*, *D. paramontana* has affinity with the former species and *D. whittingtoni*. Its phyletic relationships are unclear and must await a formal cladistic study.

In terms of wing patterning (development of infuscation along costal margin of cell $r_1$, near apex of vein $R_{4+5}$ and around dm-cu) *paramontana* has closer affinity with *D. whittingtoni* from South Africa, although the form of the male terminalia, in particular the shape of the upper surstylic lobe (Figs 32 & 33), is dissimilar to both *montana* and *whittingtoni*. Further collecting in montane regions of west Africa may reveal additional species with closer affinity.



Figs 26–37. Male terminalia of Afrotropical *Diastata* species (epandrium and surstylus in profile, upper surstylic lobe in dorsal view, gonite in ventral view). 26–28. *D. stuckenbergi* Cogan. 26. Epandrium and surstylus. 27. Upper surstylic lobe. 28. Gonite. 29–31. *D. montana*. 29. Epandrium and surstylus. 30. Upper surstylic lobe. 31. Gonite. 32–34. *D. paramontana* Cogan. 32. Epandrium and surstylus. 33. Upper surstylic lobe. 34. Gonite. 35–37. *D. whittingtoni* sp. n. 35. Epandrium and surstylus. 36. Upper surstylic lobe. 37. Gonite.

### *Diastata stuckenbergi* Cogan, 1975

Figs 10, 26–28

*Diastata stuckenbergi* Cogan, 1975: 488; Cogan, 1980*a*: 670.

Material examined: SOUTH AFRICA: Cape Province: 1 ♂ 1 ♀ (paratypes), Ceres, iv.1923, R. E. Turner (1 ♀ BMNH, 1 ♂ NMSA); 1 ♀, same data as paratypes (BMNH).

*Discussion*: This species is known only from the male holotype (BMNH) and the above material, all collected by Turner at Ceres, adjacent to the Skurweberge in the southwestern Cape. It has predominantly dark thoracic ground colour with wing infuscation restricted to the entire costal and $r_1$ cells, the apical part of cell $r_{2+3}$ and the membrane around and just anterior to dm-cu. Similar body colouring and wing patterning occurs in *D. montana*, *D. paramontana* and *D. whittingtoni*, but *stuckenbergi* is easily distinguished from these species by lacking silver pruinescent strips on the frons adjacent to the eye margins. The male terminalia are also distinctive, particularly the squat shape of the upper surstylic lobe in dorsal view (Fig. 27), the strikingly elongate sinuous setulae along the dorsal margin of the lower surstylic lobe in profile (Fig. 26), and the outline shape of the gonite in ventral view (Fig. 28).

### *Diastata tsacasi* Cogan, 1980

Figs 1, 2, 7, 20–22

*Diastata tsacasi* Cogan, 1980*b*: 245.

Material examined: SOUTH AFRICA: *Transvaal*: 1 ♂ 4 ♀, Entabeni, 23°S:30°15'E, 19–21.viii.1983, Shane F. McEvey, swept in forest (NMSA); 1 ♂, Mariepskop, Pilgrim's Rest Distr., 23–26.ii.1962, Vari & Leleup (NMSA). *Natal*: 2 ♀, Injasuti, Giant's Castle Gm. Res., 7–8.vi.1980, R. Miller & P. Stabbins, indig. for. (NMSA); 1 ♂ (holotype), Karkloof, 17.iv.1955, B. Stuckenberg (NMSA); 1 ♂ (paratype), Lions Bush, Nottingham [Road], 9.viii.1954, B. Stuckenberg, In indigenous forest (NMSA); 2 ♀ (paratypes), Town Bush, Pietermaritzburg, 5.vii.1956, B. Stuckenberg (NMSA); 1 ♂, Town Bush, Pietermaritzburg, 31.vii.1976, Raymond M. Miller (NMSA). *Cape Province*: 1 ♂, Katberg, E. Cape Prov., 15–30.i.1933, R. E. Turner (BMNH).

*Discussion*: *Diastata tsacasi* was described from three localities in the Natal midlands (Karkloof, Lions Bush, Town Bush), but is here recorded from the Transvaal and Cape Provinces for the first time, as well as from the Natal Drakensberg. The species is more widely distributed than any other Afrotropical diastatid yet recorded, possibly because it is not restricted to montane forest, also occurring in forested areas at lower altitudes. It has been collected virtually throughout the year, sometimes even in mid winter in montane areas. I believe it is also likely to occur in the eastern highlands of Zimbabwe.

It is a very striking species with the two dark, complete transverse fasciae in the apical half of the wing (Fig. 7) distinguishing it from all other Afrotropical congeners. *D. interrupta* is the only species with similar patterning, but has only one complete transverse fascia (Fig. 6). The remainder of the wing membrane in *tsacasi* is a smoky cream, although the basomedial section distal to r-m and over the basal half of the discal cell is slightly to moderately yellow-tinged.

### **Diastata whittingtoni** sp. n.

Figs 11, 35–37

Holotype: SOUTH AFRICA: 'S AFRICA: Natal #14G / Midlands, Howick / 29°29'S:30°13'E 1060 m / Date: 26.ix.1991 / Streamside vegetation / Coll: D.A. Barraclough'; 'HOLOTYPE ♂ / Diastata whittingtoni / BARRACLOUGH' [Rectangular card, red perimeter]. In fairly good condition, except right wing-tip slightly tattered. In NMSA (type no. 468).

Etymology: Named for my colleague, Andrew Whittington, who first collected this species.

Male: Dimensions (in mm): Body length [3,2]; wing length [2,5].

*Colouring/Pruinescence* (Fig. 11): Head predominantly pale yellow to pale orange with dense silver pruinescence on gena, subgena, parafacial, face, frons adjacent to eye margins and excavate section of occiput (latter also with some brown pruinescence); ground colour strikingly darker on arista, along dorsal margin of third antennal segment and dorsolaterally on occiput, but slightly darker beneath pruinescence on upper orbital plate. Thorax entirely dark brown to black, legs yellow-brown except apical 2 tarsal segments slightly darker; pruinescence mostly inconspicuously silver except slightly denser on lateral sections of mesonotum, and forming broad densely brown mid-dorsal mesonotal vitta. Wing hyaline with brown to black infuscation over extreme basal region, entire costal cell, basal third of cell $r_1$ along costal margin and indistinctly near apex of $R_{4+5}$; dm-cu surrounded by dark infuscation along entire length, this not or barely extending into adjoining cells (Fig. 11). Abdomen very dark brown with sparse brown pruinescence.

*Head*: Aristal plumosity relatively long, length about 0,8 × width of third antennal segment. Epistome not protruding anterior to vibrissal insertion in profile. Ocellar triangle positioned just anterior to eye centre in profile. Postocellar setae weakly developed, about half strength of ocellar setae.

*Thorax*: Fore femur with 1 ctenidial spine anteroventrally, length reaching 1,2 × width of tibial base in profile. Mesopleuron with 3 short setulae along posterior margin and minute setulae scattered over posterior half. Prescutellar acrostichals present, weakly developed. Crossvein r-m positioned at about basal fifth of discal cell; dm-cu slightly sinuous.

*Terminalia* (Figs 35–37): Parameres weakly developed basomedially between gonites, very closely approximated, with distinct setulae. Gonite relatively elongate in ventral view, with 2 projections in apical half (Fig. 37). Upper lobe of surstylus very slender in profile, although markedly broader basally and apical quarter to third about half width of intermediate section and sharply pointed at extreme apex (Fig. 35); about two-thirds length of epandrium in profile (Fig. 35);

inner surface with minute setulae along intermediate section in dorsal view (ie. broader basal and narrower apical regions excepted) (Fig. 36). Lower lobe of surstylus with visible section noticeably narrower at mid-length in profile (Fig. 35); long sinuous setulae (reaching 3,0–4,0 × profile width) along apical two-fifths of visible dorsal margin (Fig. 35) and with vestiture about one-third this length on inner surface.

Female: Dimensions (in mm): Body length 3,3–3,7; wing length 2,7 (wings present in paratype only).

*Head*: Aristal plumosity 0,9–1,0 × width of third antennal segment.

*Thorax*: Mesopleuron with 3–5 short setulae along posterior margin.

Other material examined: SOUTH AFRICA: 1 ♀ (paratype), Howick, 29°28′40″S:30°13′20″E, 7.ix.1990, A. E. Whittington, Streamside vegetation (NMSA); 1 ♀, same data as paratype (NMSA).

*Discussion*: *Diastata whittingtoni* is known only from Howick, Natal, where it is sympatric with *D. interrupta*. Both species have been swept from short vegetation adjacent to a small stream in a suburban area.

As stated previously *D. whittingtoni* has close affinity with two other Afrotropical species, namely *D. montana* and *D. paramontana*, both from Cameroon. All these species have strips of silver pruinescence adjacent to the eye margins on the frons, almost entirely dark thoracic colouration, and inconspicuous wing patterning with infuscation restricted mainly to the costal and $r_1$ cells and surrounding dm-cu. *D. whittingtoni* is distinguished from *D. montana* by having the wing membrane darkened near the apex of $R_{4+5}$ and infuscation noticeably dark around dm-cu. It is distinguished from *D. paramontana* by subtle distinctions in wing patterning (see species key), and more strikingly by the sharply pointed apex of the upper surstylic lobe (Fig. 35), which is quite distinct from the smoothly rounded apex in the former species (Fig. 32). As discussed under *montana*, the male terminalia of *whittingtoni* have closer affinity with the former species, particularly as both have the distal part of the upper surstylic lobe sharply narrowed with the extreme apex pointed. However, *whittingtoni* is distinguished from *montana* (character states in square parentheses) as follows: visible section of lower surstylic lobe slender in profile, noticeably narrower at mid-length, sinuous dorsal setulae restricted to apical half (Fig. 35) [lobe relatively broad, not narrower at mid-length, setulae distributed along much of length (Fig. 29)]; ventral aspect of gonite with 2 medially directed projections in apical half (Fig. 37) [gonite without noticeable projections in apical half (Fig. 31)].

## SUBFAMILY CAMPICHOETINAE

### *Campichoeta* Macquart, 1835

*Campichoeta* Macquart, 1835:547. Type species (Palaearctic): *Campichoeta rufipes* Macquart, 1835 [= *Diastata obscuripennis* Meigen, 1830], by monotypy.

*Campichoeta* is a small genus, which prior to the description of the two Afrotropical species (see below), included only seven Holarctic species. Five of these species are Palaearctic (see Papp 1984), mostly widespread except for *C. fumigata* Duda (Canary Islands) and *C. zernyi* Duda (Lebanon). *C. griseola* (Zetterstedt) is a Holarctic species (western Europe and widespread in North America), which has close affinity with the only endemic Nearctic species, *C. latigena* McAlpine from the southwestern United States.

The Afrotropical species appear to be distinguished from congeners by slightly longer aristal vestiture, and more significantly by the presence of well developed setae on the dorsolateral regions of the occiput. They are also distinguished from all Holarctic species by having the basal segments of the antenna dark and the entire palpus yellow (see McAlpine (1962: 3)). The occipital setae are lacking in the type species, *C. obscuripennis* (Meigen), the only Holarctic species which I have examined. Such setae are not referred to in McAlpine's 1962 revision of *Campichoeta* and I have therefore assumed they do not occur in Holarctic species. I believe there are clearly insufficient grounds for the exclusion of the Afrotropical species from *Campichoeta*, based on this apparent apomorphy. Both of these species agree very well with *Campichoeta* in terms of virtually all other external characters, as well as features of the male postabdomen (female postabdomen not examined). Significant character states shared by all species include: large reclinate orbital seta not inserted at anterior extremity of upper orbital plate; lack of mesopleural vestiture; absence of humeral break of costa; cubital vein with apical

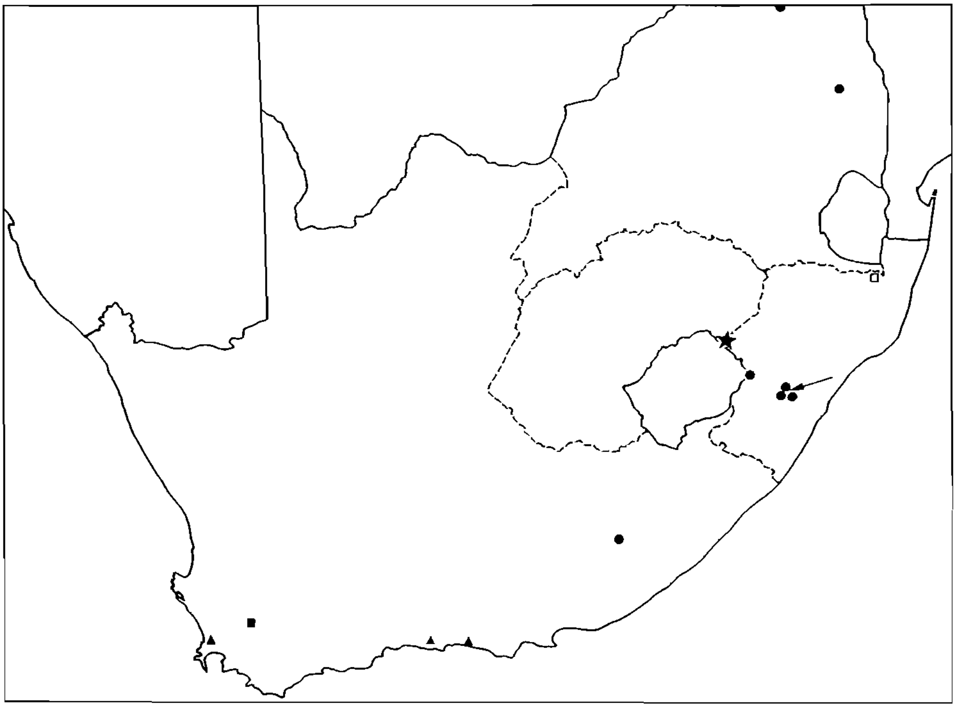


Fig. 38. Distribution of Diastatidae in southern Africa. [★ = *Campichoeta natalensis* sp.n.; □ = *D. falcata* sp. n., ● = *D. tsacasi* Cogan, ▲ = *D. carolinae* Cogan, ■ = *D. stuckenbergi* Cogan (arrowed locality = *D. interrupta* and *D. whittingtoni*).]

section elongate; presence of seventh abdominal spiracle in membrane; development of unilobate surstylus, apparently fused to epandrium.

I have not been able to examine the female postabdomen of either Afrotropical species, since each of the known females is a holotype. In Holarctic species it is quite distinct from *Diastata* (eg. see Papp 1984), distinguished as follows: sixth and seventh tergites free; cerci short; sclerotised spermathecae present; ventral receptacle weakly sclerotised.

The Afrotropical species are restricted to montane forest at altitudes of 1500–3000 m in east Africa and the eastern part of South Africa (Fig. 38). It is likely that habitats will prove to be similar to those of Holarctic species. McAlpine (1962) stated that the latter species inhabit rich, herbaceous vegetation in and adjacent to moist woodland, and have been collected from stream banks. As in *Diastata*, males of Holarctic *Campichoeta* are known to vibrate their wings when sexually excited (McAlpine 1962).

### Key to Afrotropical species of *Campichoeta*

1 Face entirely dark, strikingly contrasted with pale parafacial. Propleural region and humeral callus entirely dark. Sternite 1 dark. Male terminalia as in Figs 23–25. [Ethiopia; Kenya] ................................ **edwardsi** sp. n.

– Face and parafacial entirely yellow. Propleural region and humeral callus mostly pale. Sternite 1 (when exposed) pale. [Natal Province, South Africa] .. **natalensis** sp. n.

### **Campichoeta edwardsi** sp. n.

Figs 3, 12, 23–25

Etymology: Named for F. W. Edwards, collector of the holotype.

Holotype: KENYA: 'Cedar forest'; 'Mt. Kinangop. [00°37'S:36°42'E] / 8000 ft. / F.W.Edwards.'; 'KENYA: / Aberdare Range. / x.1934 / B.M.E.Afr.Exp. / B.M.1935-203.'; 'HOLOTYPE ♀ / Campichoeta edwardsi / BARRACLOUGH' [Rectangular card, red perimeter]. In good condition. In BMNH.

Male: Dimensions (in mm): Body length 2,4; wing length 2,1.

*Colouring/Pruinescence* (Fig. 12): Head dark brown to black, except frons anterior to upper orbital plate dark yellow-brown, parafacial yellow and gena and subgena predominantly cream; pruinescence sparse or absent, silver when visible. Thorax predominantly dark brown, yellow to yellow-brown as follows: extreme apex of scutellum (sometimes), upper margin of hypopleuron (indistinctly), haltere and legs (apical 2 tarsal segments slightly darker); pruinescence sparsely silver on pleuron and brown on mesonotum. Mesonotal vittae absent. Wing almost entirely hyaline although profuse microtrichia confer darker appearance, very slightly tinged with brown over cell $r_1$ and over much of cell $r_{2+3}$ (Fig. 12). Abdomen dark brown to black, not noticeably darker along posterior margins of tergites; sternites 1–2 dark, segment 6 and successive segments (including much of terminalia) pale brown.

*Head*: Aristal pubescence rather long, length reaching 0,5 × width of third antennal segment. Facial width above epistome about 1,8–2,0 × total height of face. Epistome protruding slightly anterior to vibrissal angle in profile. Genal/subgenal depth about 0,4 × width of third antennal segment. Occiput with a few inconspicuous supracervical setae, and dorsolateral regions each with 2 medially directed setae, these 3,0–4,0 × length of supracervicals, not appearing slightly compressed at high magnification. Ocellar triangle positioned about coincident with eye centre in profile. Postocellar setae present, slightly to noticeably weaker than ocellar setae.

*Thorax*: Fore femur with row of inconspicuous, weakly developed ctenidial spines along apical half of anteroventral surface, a single spine (about midway along row) noticeably longer and stronger than others. Prescutellar acrostichals present, fairly well developed. Evenly spaced costal setulae not or barely distinguishable from other setulae on costa. Crossvein r-m positioned at about basal two-fifths of discal cell; dm-cu virtually straight or very slightly sinuous.

*Postabdomen and terminalia* (Figs 23–25): Tergite 6 bare, dorsal length about 1,3 × that of tergite 7. Tergite 7 with single row of inconspicuous setulae along posterior margin. Surstylus present, fairly broad basally in profile with apical two-thirds slender (less than one-third basal width) and finger-like with smoothly rounded apex, dorsal margin with very inconspicuous serial vestiture visible at high magnification only. Gonite in ventral view with blade-like lobe forming simple point at apex, not strongly distinguished from rod-like lobe (Fig. 25) [blade-like and rodlike lobes = anterior and posterior gonopophyses of McAlpine (1962)].

Female: Dimensions (in mm): Body length [2,5]; wing length [2,3].

*Colouring/Pruinescence*: Abdomen with segment 6 and successive segments (including terminalia, cercus excepted) strikingly white.

*Head*: Occiput with dorsolateral setae appearing slightly compressed at high magnification. Prescutellar acrostichals absent.

Other material examined: ETHIOPIA: 1 ♂ (paratype), Mount Chillálo, circa 9000 ft, 14.xi.1926, Dr H. Scott, forest (BMNH). [This male was not designated holotype because the right third antennal segment and three tarsi are missing.]

Discussion: The development of dorsolaterally positioned occipital setae and of prescutellar acrostichals, appears to differ between the sexes. These are weaker, not appearing compressed (dorsolateral occipitals) and present (acrostichals) in the male only. I do not, however, consider that prescutellar acrostichals will always prove to be present in males and absent in females; in *Diastata carolinae*, for example, they are variably developed.

The surstylic profile of *edwardsi* (Fig. 23), with relatively broad base and noticeably tapered apical two-thirds is reminiscent of *C. zernyi* Duda from Lebanon (see McAlpine (1962: 5)). However, the apex is sharply pointed and incurved apically in *zernyi*, quite unlike the distinctive, smoothly rounded apex of *edwardsi*.

The latter species is know only from montane forest at or above 2600 m within the East African Rift System, in southwestern Kenya and the southern highlands of Ethiopia.

### **Campichoeta natalensis** sp. n.

Fig. 13

Holotype: SOUTH AFRICA: 'Royal Natal / National Park, [28°41'S:28°59'E] / Drakensberg Mts. / B. & P. Stuckenberg'; 'From montane forest / 11.ix.63 / 1530 m'; 'HOLOTYPE ♀ / Campichoeta natalensis / BARRACLOUGH' [Rectangular card, red perimeter]. In fairly good condition, except apical half of left arista detached and right mid tibia and tarsus missing. In NMSA (type no. 469).

Etymology: Refers to the provenance of this species (Natal, South Africa).

Male: Unknown.

Female: Dimensions (in mm): Body length [2,4]; wing length [2,2].

*Colouring/Pruinescence* (Fig. 13): Head mostly dark brown to black, except anterior margin of frons dark yellow-brown, entire facial region and parafacial yellow and gena and subgena predominantly cream; pruinescence sparse or absent, silver or pale yellow when visible. Thorax predominantly dark brown, yellow to yellow-brown as follows: extreme apex of scutellum, ventral section of humeral callus, entire propleural region, hypopleuron, haltere and legs (apical 2 tarsal segments slightly darker); pruinescence sparsely silver on pleuron and brown on mesonotum. Mesonotal vittae absent. Wing almost entirely hyaline although profuse microtrichia confer darker appearance, very slightly tinged with brown over cell $r_1$ and over much of cell $r_{2+3}$ (Fig. 13). Abdomen mostly dark brown, although black along posterior margins of tergites; sternites 1–2 yellow-brown, segment 6 and successive segments (including terminalia) strikingly white.

*Head*: Aristal pubescence rather long, length reaching 0,5 × width of third antennal segment. Facial width above epistome 1,6 × total height of face. Epistome protruding slightly anterior to vibrissal angle in profile. Genal/subgenal depth about 0,5 × width of third antennal segment. Occiput with numerous supracervical setae, and dorsolateral regions each with 2–3 medially directed setae, these 2,0–3,0 × length of supracervicals and narrower basally, appearing slightly compressed at high magnification. Ocellar triangle positioned about coincident with eye centre in profile. Postocellar setae present, only slightly weaker than ocellar setae.

*Thorax*: Fore femur with row of inconspicuous, weakly developed ctenidial spines along apical half of anteroventral surface. Presutellar acrostichals absent. Evenly spaced costal setulae very weak, just distinguishable from other setulae on basal half of costa. Crossvein r-m positioned at about basal two-fifths of discal cell; dm-cu virtually straight.

## DISTRIBUTION PATTERNS OF AFROTROPICAL DIASTATIDAE

A point of great interest is the boreal distribution of the Diastatidae within the Afrotropical Region. The mainly Palaearctic genus *Campichoeta* is restricted to montane regions of Ethiopia and Kenya (*edwardsi*) and eastern South Africa (*natalensis*), while the predominantly northern hemisphere genus *Diastata* is recorded from montane areas of Cameroon in West Africa (two species) and from similar elevations and lower altitude in South Africa (six species) (see Fig. 38). Such distributions have been noted before in other Invertebrata, including Diptera; van Emden (1939) for example, stated that insects at high altitude in east Africa are otherwise Palaearctic and northern Oriental. Stuckenberg (1963) maintains that boreal dipterous elements in the South African fauna, dispersed from the Palaearctic Region via an irregular series of highlands through Ethiopia and down the eastern side of Africa. The close affinity of the east and southern African *Campichoeta* species would seem to corroborate this theory. In the same paper the example is also given of the opomyzid genus *Geomyza*, which is Holarctic, but also with a single Afrotropical species from Mt Kilimanjaro in northern Tanzania. Another boreal element with a montane provenance in Africa is a species of *Trichieurina* Duda (Chloropidae) from Viphya Mountain in Malaŵi (see Stuckenberg 1982); *Trichieurina* is otherwise based on two species from Europe and the western U.S.S.R. (Nartshuk 1984).

Stuckenberg (1982) has, however, also cautioned against the east African dispersal theory. He noted that highly discontinuous elements in the African Diptera might be older than would have resulted from the suggested dispersal (probable during the Pleistocene glacial periods). Such an alternative theory, ie. that disjunct distribution patterns could have resulted from increasing tropical savannafication during the Tertiary (Stuckenberg 1982:146), appears to be a more feasible explanation for the distribution of Afrotropical *Diastata* species. These are unrepresented in the east African highlands, and of significance is that *D. whittingtoni* (Natal, South Africa) has closer affinity with the two Cameroon species than with the southern African species. The striking discontinuity in the distributions of these species could well be explained by contraction of their ranges following dramatic climatic and vegetational changes.

In conclusion, I believe it is pertinent to compare the distribution of *Diastata* species in southern Africa with those of various montane invertebrates discussed by Stuckenberg (1962). A composite distribution map of the latter taxa (Fig. 7, p. 198) shows them to be confined to two major Centres, namely the Cape and the Eastern Highlands, and that the latter comprises three subcentres: (1) the Lesotho-Drakensberg Highlands, (2) the Amatola Range and (3) the Eastern Transvaal. Careful comparison of the distribution of *Diastata* species (Fig. 38) with the composite distribution map, shows that there seem to be distributions with comparable boundaries, although this will probably only become more apparent when further localities of *Diastata* are recorded. Thus *D. carolinae* and *D. stuckenbergi* are from the Cape Centre, *D. tsacasi* occurs throughout the Eastern Highlands Centre, and all other species are confined to the Lesotho-Drakensberg subcentre. The wide distribution of *tsacasi* is significant, although it is restricted to the Eastern Highlands. As observed by Stuckenberg (1962: 201), few such species are additionally distributed through the Cape Centre. The dry Fish River valley is likely to be an ecological barrier preventing the southwestern dispersal of such taxa (see Stuckenberg (1962: 201)).

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I am very much indebted to Mr John Chainey (BMNH), who responded so promptly to my two requests for loans of Afrotropical diastatid material (including types) under his care. Dr Ray Miller (University of Natal, Pietermaritzburg) kindly allowed me access to his private collection of Diptera, which included additional material of *Diastata* species, most notably the type series of *D. falcata*; all this material is now deposited in the Natal Museum. Mr Andy Whittington (NMSA) helped considerably by directing me to the type locality of *D. interrupta* and *D. whittingtoni*. Mrs Shirley Robertson (NMSA) assisted with fieldwork and provided expert technical assistance. Dr Brian Stuckenberg, Director of the Natal Museum, and Mr Andy Whittington kindly reviewed a draft form of this paper.

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